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REVIEW OF INTERGOVERNMENTAL DISSEMINATION OF FEDERAL RESEARCH AND DEVELOPMENT RESULTS

SPECIAL OVERSIGHT REPORT NO. 5

SUBCOMMITTEE ON
DOMESTIC AND INTERNATIONAL
SCIENTIFIC PLANNING AND ANALYSIS

OF THE

COMMITTEE ON
SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
NINETY-FOURTH CONGRESS
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LETTER OF TRANSMITTAL

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, D.C., July 15, 1976.

Hon. OLIN E. TEAGUE,
Chairman, Committee on Science and Technology, House of Representatives, Washington, D.C.

DEAR CHAIRMAN TEAGUE: I am pleased to submit to you our report on the hearings on Intergovernmental Dissemination of Federal Research and Development Results conducted by the Subcommittee on Domestic and International Scientific Planning and Analysis.

The effective dissemination and utilization of Federal research and development results offers the nation a vast and largely untapped resource for addressing the problems facing government jurisdictions at all levels. Mechanisms for intergovernmental exchange of information and Federal assistance in the application of innovative technology developed from federally funded research has been the subject of extensive study over recent years, and there is a history of interest in this subject by our Committee. This interest was highlighted in 1972 by the co-sponsorship of a major conference "The National Action Conference on Intergovernmental Science and Technology Policy" held at Harrisburg, Pennsylvania. Former Chairman George P. Miller stated in the resulting Committee Report, *Public Technology:* "... the opportunity which we now have to make a significant attack on the problems faced by our society, while at the same time making the best possible use of the country's highly trained technical and scientific manpower resources, should be widely understood and appreciated."

The Rules of the Committee on Science and Technology place responsibility in the DISPA Subcommittee to continue this effort with legislation, oversight, and other matters relating to coordination of research and development and more specific to this report, Federal-regional-state-local relations in science and technology.

The Subcommittee has conducted hearings and performed studies to fulfill this aspect of our responsibilities. We find that there still exists a need to move forward from studies of problems in public technology to the development of specific approaches which have the potential for legislative action. The present report includes these recommendations. I believe the review of problems undertaken during our hearings and the development of recommendations in this report are timely and indicate a need for continued focus in this important area.

Sincerely yours,

RAY THORNTON,
Chairman, Subcommittee on Domestic and International Scientific Planning and Analysis.

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SPECIAL OVERSIGHT

Research and development is conducted throughout the Federal Government. Most agencies and departments support research and development to further advances in those fields of science and technology which are related to their mission.

In the House of Representatives these research and development activities are reviewed individually by a number of standing Committees having jurisdiction of the various programs, agencies, and departments. Beginning with the 94th Congress, the rules of the House provide that a continuing review of the entire Federal research and development effort be done. For this purpose the Committee on Science and Technology is charged with the function of Special Oversight in this area. Rule X, paragraph 3(f) provides that "The Committee on Science and Technology shall have the function of reviewing and studying, on a continuing basis, all laws, programs, and Government activities dealing with or involving non-military research and development." This Special Oversight function is to be performed in addition to the legislative and direct oversight function of the standing committees.

The review and the recommendations included in this report are made pursuant to this special oversight provision of the House rules.

RECOMMENDATIONS

The hearings [1] covered by this report were held to develop an overview of current technology sharing efforts at the Federal level. These efforts involve the dissemination of information and technologies developed as a result of federally funded research and development and their use in non-federal jurisdictions such as State and local governments. The hearings were structured to allow the Subcommittee to assess the status of the Federal science and technology efforts from the perspective of how effectively the results are being used or could be used to address domestic problems. From these hearings an assessment of current mechanisms and a consideration of possible changes needed in intergovernmental institutional arrangements for technology sharing was developed.

During the hearings, the Subcommittee focused on three perspectives from which the potential utility of Federal R. & D. for solution of national problems are viewed.

1. Opportunities as perceived by individuals at the non-federal level of government to utilize and make appropriate adaptions of innovative techniques with potential for solving the problems of local jurisdictions.

2. Opportunities as perceived by individuals representing non-governmental entities to play an effective role in the dissemination and utilization of innovative techniques developed at the Federal level in non-federal jurisdictions.

3. Efforts within the Administration and the Executive agencies to coordinate R. & D. funding for dissemination and utilization of results from successful projects.

The Subcommittee received testimony from witnesses representing the wide spectrum of perspectives identified above and requested written responses from seventeen Federal agencies and commissions in addition to reviewing and summarizing basic studies undertaken on Public Technology. From these efforts the following recommendations for future activities are made.

Federal-Level Efforts for Effective Technology Sharing

The research and development efforts supported with Federal funds is a major segment of all national R. & D. It is the successful results of these efforts that could be disseminated and utilized by all levels of government if national resources are to be most effectively expended. Public funds are supporting R. & D. efforts with results which could have useful application to many problems facing jurisdictions across the nation through technology sharing. The first of the recommenda-

[1] U.S. House of Representatives. Committee on Science and Technology. Ninety-Fourth Congress. No. 48 Subcommittee on Domestic and International Scientific Planning and Analysis. Oversight Hearing on Intergovernmental Dissemination of Federal Research and Development Results, November, 1975.

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tions by the Subcommittee focuses at the Federal level—the utilization of R. & D. results to their fullest and suggests consideration of the following recommendations.

RECOMMENDATION 1

A Review of Legislation and Regulations Affecting Individual Agency Technology Sharing Efforts Should Be Undertaken

Each agency functions under legislative mandates formulated in their Committee of jurisdiction and the regulations [issued in accordance with this legislation]. The degree of commitment with different agencies to technology sharing is undoubtedly related to the emphasis in legislation and the resultant regulations related to this activity.

There is also legislation which affects technology sharing activities by all agencies: for example, the Intergovernmental Personnel Act. And, lastly, there is the potential of conflict between different agency legislation and resultant mandates and umbrella legislation affecting all agencies. Before further legislation is considered in this field, a review of the existing legislative basis for technology sharing should be done.

RECOMMENDATION 2

Mechanisms Now Existing to Coordinate Agency Efforts Should be Analyzed Both in Terms of Individual Performance and in Terms of Their Interactions

There are currently in existence several Federal level entities with responsibility to oversee or encourage technology sharing. These include the Federal Coordinating Council for Science, Engineering, and Technology, the Domestic Council, the Office of Management and Budget, the Undersecretary Group for Regional Operations, the Regional Councils, and the National Science Foundation. Studies exist of many of these entities which should be used to determine if individually or collectively they should be strengthened, altered or dissolved.

RECOMMENDATION 3

The Community of Individuals Involved in Technology Sharing Should be Asked to Address the Need For and Structure of an Interagency, Executive Office Level Institution to Make Technology Sharing More Effective

Existing entities charged with coordination have demonstrated a general inability to effectively coordinate efforts to disseminate and utilize the R. & D. results of individual agencies. These efforts frequently overlap and if coordinated could be more useful in addressing national problems at the local level. Consideration of a new high-level organization with a strong mandate including adequate funding and staff with careful legislative oversight should be considered.

Intergovernmental Activities Related to Technology Sharing

The successful results of federally funded R&D will not be applied to solve pressing problems faced by non-federal jurisdictions unless there are mechanisms for intergovernmental coordination. A previous, prevailing belief that innovative techniques developed at the Federal level will find an automatic application to state and local problems has been demonstrated to be difficult to justify. This approach has been termed "technology push," and has not been successful in most cases. A second approach "demand pull" suggests a different, more defensible orientation—communication and coordination between the levels of government from the initial stages of R&D programs including communication to the Federal research community of needs and problems of the non-federal level. This approach has shown more success in matching available technology with existing problems.

RECOMMENDATION 4

Current Efforts to Develop Federal-Regional-State-Local Coordination Should be Further Encouraged

There are existing intergovernmental coordinative mechanisms which are experiencing some success with technology sharing. Individual agencies have efforts currently underway and within the National Science Foundation the Intergovernmental Science and Research Utilization program is one such effort. The effectiveness of these efforts has been hampered by two major constraints. First, there has been limited funding and uncertain commitment at top agency levels to technology sharing activities. Second, there is reluctance by some non-federal units of government to participate in programs with predetermined phase-out periods. These often leave non-federal jurisdictions with the dilemma of continuing a program with a newly developed constituency when they already have limited funds. To encourage intergovernmental coordination the reward structures within agencies should be strengthened and attention focused on the question of how, once proven successful, innovative programs should be supported.

RECOMMENDATION 5

New Techniques for Intergovernmental Coordination in the Utilization of Federal R. & D. Results Should Be Considered

The successful example of the Agricultural Extension Service suggests the possibility of developing a technology agent program to assist state and local governments in applying innovative techniques and developing in-house scientific capabilities. The extension service concept could evolve within the Federal Laboratory Consortium program, the Office of Management and Budget, or the new Office of Science and Technology.

There is currently an experimental effort with twenty-seven medium-sized cities, the Urban Technology System, developed with assistance from several agencies and coordination support from Public Technology, Inc. This experiment could serve as a prototype for a formalized technology sharing office above individual mission agencies.

RECOMMENDATION 6

There Should Be Consideration of Federal Support for the Vertical Transfer of Innovative Technologies Between Jurisdictions

The innovative city or other local jurisdiction often finds its manpower and other resources strained as requests from jurisdictions with similar problems turn to them for demonstrations and assistance of solutions found successful. Such jurisdictions could be assisted by development of a program of exemplary projects similar to the one developed by the National Institute of Law Enforcement, the research arm of the Law Enforcement Assistance Administration. Federal funds would be required to develop and disseminate the information and provide manpower to assist in needed alternations to fit unique local problems.

Role of Nongovernmental Entities in Technology Sharing

Universities, non-profit organizations and private industry all play a role in technology dissemination and utilization. They frequently serve as intermediaries assuming a position between the sponsor of the initial research effort and the ultimate user, in this case between the Federal agency and state and local governments. They can also be responsible for the initial research effort. In either case, where Federal funds are used to do research on and develop new techniques, it is desirable to focus attention on the most effective utilization of the results. Considering the important role these entities play the following activities are recommended:

RECOMMENDATION 7

Universities and Nonprofit Organizations Should Be Examined in Terms of Their Ability To Serve in the Capacity of Technology Transfer Agents

The example of the Agricultural Extension Service was noted in Recommendation 5. There are other university related efforts which could serve as models for technology transfer. The examples at the University of Arkansas of the Industrial Research and Extension Center and at the Penn State University of PENNTAP are both successful efforts to design mechanisms for the effective dissemination of already existing technical knowledge. Public Technology, Inc. and the Midwest Research Institute are non-profit organizations which exemplify efforts to develop the linkage between

R. & D. and public and private sector needs. They, as well as the universities, offer an opportunity to develop needed information systems to bridge the gap between R. & D. and users. Since the most significant deterrent to their effectiveness is continuous, stable support, consideration of the proper role of the Federal government to support these activities is appropriate and timely.

RECOMMENDATION 8

The Question of What Incentives and Constraints can be Used, by Governmental Units in Their Interactions with Private Industry, to Encourage Development of Innovative Techniques and Devices for Which the Public Sector Would Be the Primary Consumer Should Be Addressed

Governmental entities should recognize the influence which their actions, such as regulations and procurement, have on decisions within private industry. There remains a need for an effort to understand and develop techniques to encourage private industry in the modification of existing products and development of innovations to solve public sector problems. Both positive inducements and the effect of existing constraints must be considered.

ANALYSIS OF HEARINGS*

On November 4. 1975 the Committee on Science and Technology's Subcommittee on Domestic and International Scientific Planning and Analysis began three consecutive days of hearings on intergovernmental dissemination of Federal Research and Development Results. In his opening remarks, Subcommittee Chairman Ray Thornton identified the topic as timely and important, and stated that the hearings on this aspect of intergovernmental science were one phase of the Subcommittee's effort to examine national priorities for scientific R. & D. and to explore aspects of particular scientific resources. Key objectives of the intergovernmental science hearings were: to explore existing mechanisms for the dissemination of Federally funded R. & D. results; to identify requirements for change in existing, or creation of new, capabilities for scientific and technical information dissemination; and to consider the effectiveness of existing mechanisms by which State and local government jurisdictions apply Federal R. & D. results to a wide range of public needs and problems.

Chairman Thornton referred to the many existing studies and reports concerning intergovernmental science and technology, acknowledging a growing record of concern over the subject of the hearings. With reference to available study results and various sets of policy and program recommendations, Mr. Thornton indicated that it was not the Subcommittee's intention to duplicate reported information and suggestions, but to provide an opportunity to extend the record, and to build upon the existing knowledge base. Accordingly, the hearings were designed to allow expression of newly perceived needs and opportunities, and to investigate issues from several distinct points of view.

The first day of hearings centered on the user perspective. Representatives from various State and local government organizations spoke to both effective and problematic, or at worst non-existent, aspects of Federal dissemniation activities. Witnesses appearing on the first day were: Mr. Robert E. Merrian, Chairman, Advisory Commission on Intergovernmental Relations; Mr. J. Hugh Nichols, Member House of Delegates, State of Maryland; Dr. Thomas G. Fox, Governor's Science Advisor, State of Pennsylvania; and, the Honorable Arthur Holland, Mayor of the City of Trenton, New Jersey.

The second day included representatives from universities, nonprofit groups and industry. They were: Dr. Charles E. Bishop, President, University of Arkansas; Dr. Walter Grattidge, Manager of Technical Information, Corporate Research and Development, General Electric Company; Mr. John McKelvey, President, Midwest Research Institute; and Dr. H. LeRoy Marlow, Director, Pennsylvania Technical Assistance Program.

*This summary and analysis was prepared by Ms. Susan Doscher with the assistance of Ms. Wendy Schacht, Science Policy Analysts, Science Policy Research Division, Congressional Research Service, the Library of Congress.

On the third and final day, the hearings viewed the subject from the Federal agency perspective. The Subcommittee heard from: Dr. Charles Orebeke, Assistant Secretary for Policy Development, Department of Housing and Urban Development, accompanied by Mr. Allan Siegel and Ms. Heather Aveilhe; Mr. William Steber, Acting Assistant Secretary for Systems Development and Technology, Department of Transportation, accompanied by A. B. Linhares; and Dr. M. Frank Hersman, Former Head, Office of Intergovernmental Science and Research Utilization, National Science Foundation.

In addition, seventeen other agencies were requested to respond to written questions submitted by the Subcommittee. Some program descriptions which are illustrative of information dissemination undertakings and are beneficial in understanding the varying degree of the breadth of programs in individual agencies are discussed in conjunction with the testimony of witnesses. It should be noted, however, that the full extent of information on transfer programs could not be included in this summary. The complete responses are included in the record of the hearings.

OBJECTIVES OF INTERGOVERNMENTAL DISSEMINATION OF FEDERAL R. & D. RESULTS

An appreciation for the importance of intergovernmental dissemination of Federal R. & D. results by both witnesses and Subcommittee members gave continuity and purpose to the three days of hearings. Because of this common understanding, relatively little time was spent in justifying the need for intergovernmental dissemination capabilities. Emphasis was placed instead on an examination of existing capabilities, on means by which such capabilities could be improved, on identifying requirements for new policies, programs, or other mechanisms, and on the roles of government and non-government organizations in implementing the process.

The major objective behind programs for intergovernmental dissemination of R. & D. results may be viewed as one of attempting to link available scientific and technical resources with a wide range of public needs. In concept and practice, the process implies the strengthening of State and local government capabilities to identify needs suited to scientific and technical solution, to assess potentially applicable scientific and/or technical resources, and to effectively apply the knowledge when and where appropriate. In addition, the process is viewed as one leading to increased productivity at the State and local government levels.

The View From State and Local Government

Over the past decade, requirements for States and localities to be able to understand, assess, adapt, and apply science and technology in public policy-making and administration, have become more vital. Increasingly, State and local governments must deal with a wide range of issues which directly involve or affect science and technology. Often their need to deal with such issues evolves from federal action—legislation resulting in capacity building efforts and/or shared responsibilities with the various levels of government for implementation. During the first day of hearings, Mr. J. Hugh Nichols from the House of Delegates in Maryland spoke to the growing responsibilities of State and local governments in science and technology policy matters:

> The States, in addition to being delegated responsibility to implement federally enacted legislation in such areas as environmental management, public safety, energy conservation, and water quality, are being pressed also by their constituents to set up comprehensive programs in land reclamation, land management, energy resource development and regulation, health care delivery and in a myriad of other complex areas. The very nature of such programs demand the support of reasonable R. & D. programs [p. 18].
>
> The problems that face the States demand that effective R. & D. tools be integrated into the decisionmaking process and [that] we do recognize them as being important. [p. 19].

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Later in his testimony, Mr. Nichols reiterated the importance of the State and local government role in applying science and technology to civilian needs:

To insure the effective utilization of Federal R. & D. programs, it is critical that the State and local user communities become full partners with the Federal agencies, from the development of program priorities, to the formulation of guidelines, administration and oversight of projects, and the design of the final implementation programs. If the user community has such a vested interest in Federal R. & D. program activities, they will be far more receptive to utilizing the programs' output [p. 44].

At the conclusion of the three days of hearings, Mr. William Knox, Director of the National Technical Information Service, Department of Commerce, corroborated this point:

I just want to re-emphasize the importance of having State capability to apply the technology, to know what the demand is and to apply it. I would like to emphasize it in a quantitative fashion by pointing out that many of our States are of the same size as certain European countries, which on their own initiative and at their own expense do fund national technology transfer entities. [p. 256].

The View From the Private Sector

Dr. Walter Grattidge, from the General Electric Company, in substantiating the importance of scientific and technical information to States and localities, spoke of the vital role of scientific and technical information in the private sector and proceeded to draw parallels with information needs in the public sector:

Of the approximately $32 billion spent on R. & D. activities in the United States in 1974, 42 percent of the total was spent by industry, and 53 percent was spent by Government. It is estimated that $4.6 billion was spent in 1974 by Government in its own R. & D. facilities and laboratories.

Thus, in parallel with the industrial R. & D. sector, the requirement for scientific and technical information exists in the governmental sector. [pp. 133–134]

In order to successfully meet the requirement for scientific and technical information in the public sector, Dr. Grattidge said there must be intergovernmental coordination:

At this time, in many areas, the various Federal, State and local systems are fragmented, even in those fields for which there are apparently parallel missions. The leadership initiative rests with the Federal agencies but for any coordination to be effective it must be developed with the active consent and participation of all parties. [pp. 134–135]

By pointing to the need for intergovernmental coordination, Dr. Grattidge's statement underscored one of the central mechanisms associated with effective intergovernmental dissemination of R. & D. results.

ELEMENTS AND MECHANISMS ASSOCIATED WITH THE PROCESS

A consensus appeared to exist as to some of the fundamental elements and mechanisms integral to the intergovernmental dissemination process. One central element just referred to and discussed in a following section is intergovernmental coordination. Some others include: person-to-person interface; user-need identification; selective information processing; balance between technology-push and need-pull.

Personal Interface

Affirming the importance of people in the process, Dr. Grattidge stated, "Communications are the heart of information transfer. The importance of inter-personal interactions integrated with formal document transactions within STI [scientific and technical information] systems must be recognized". [p. 133] Mr. John McKelvey, President of Midwest Research Institute, noted that in order to promote the effective dissemination of useful R. & D. results, state and local liaison personnel should be involved in the planning for R. & D. programs directed at the needs of state and local governments.

Both NASA and ERDA (among others) have developed programs and procedures which provide for extensive personal interface and Federal involvement in the R. & D. program planning process. Under the Technology Utilization Program at NASA (which is just one of the programs within that agency which employs the personal interface mechanism), field organizations in the form of Applications Teams interact directly with State and local government. They work to delineate local needs and to provide solutions through the use of the application of NASA technology. In addition, NASA personnel are assigned to State and local agencies to assist in the acquisition and the optimum application of NASA technologies and knowledge to meet the requirements of these sub-national units. Personal interface continues between the Federal agency and the State and local governments in the conduct of Applications Projects where specific technologies are demonstrated, adapted and/or modified to meet local needs.

Within ERDA, the Division of Geothermal Energy conducts numerous Geothermal Technology Applications efforts which involve State and local government directly in planning and impact assessments for the development of geothermal energy or in the actual development of projects. Various local governmental agencies, universities and/or private groups have contracted to work with ERDA on the development of plans tailored to the local requirements. The Division of Biomedical and Environmental Research's Analysis and Assessment Program under the Assistant Administrator for Environment and Safety is active in State and regional liaison. This is a consequence of

the requirement that the development of the Analysis and Assessment Programs occur through user input. In addition, there is the understanding that adequate assessments necessitate data in addition to that available to the Federal Government which can be provided by State and local agencies.

Mr. McKelvey noted that person-to-person interfaces can be achieved through intern programs, the establishment of permanent liaisons between government offices, liaison committees, special consultants, and similar mechanisms. [pp. 146–148]

A large part of the success of the Pennsylvania Technical Assistance Program (PENNTAP), according to its Director Dr. Leroy Marlow, derives from its reliance on the demand of personal interaction:

> We emphasize that technology transfer is a human activity. The mere availability of information does not cause its transfer or use. Printed materials alone, even expertly prepared, cannot stimulate interpersonal relations, define a problem, answer related questions, involve consulting authorities, provide follow-through on problems or relate to other agencies. [p. 166]

Extensive liaison activities have been established by the Department of Agriculture, the Department of Interior, The Environmental Protection Agency and the Federal Energy Administration, among others. Within the Department of Agriculture which makes the most use of agency personnel at the State and local level, the Forestry Service and the Soil Conservation Service demonstrate two differing, yet successful, approaches to liaison activities. The Forestry Service effects transfer through State foresters and State officials with similar working responsibilities. The information generated by the Research and Equipment Development Centers is dissemiated to the client through specialists (both State employees and private individuals), directly through research scientists, EDC technicians, contracts, the media, and/or through the Office of Information and Visitor Information Service. In contrast, the Soil Conservation Service provides soil conservationists in each State. There are 3,000 locally organized conservation districts to which technical information is transfered. These districts in turn work with State and local agencies to determine local needs and provide technical assistance in soil, water and resource development. [pp. 281–289]

The Bureau of Mines, within the Department of Interior, has thirty-eight State Liaison Officers who maintain working quarters parallel to State geologists' offices. This information and technological data are transferred on a one-to-one basis. There are forty-six cooperative agreements between the Bureau and the States which serve to ensure the collection and exchange of mineral data. Four field operation centers and thirteen research centers and labs, in addition to the State Liaison Officers, work with subnational units in the utilization of information.

The Environmental Protection Agency programs generally provide technical assistance to all State and local governments through Regional Offices. The staff within these offices work directly with State and local personnel and offer technical assistance in problem evaluation and potential solutions. Information is disseminated through the Regional Offices and help is extended in the formulation of the research and development programs to assist the sub-national governments meet requirements of environmental legislation. These offices can also call

upon the laboratories within the Office of R. & D. to provide additional expertise. The Technology Transfer Program within the Office of Research and Development disseminates information directly to "consulting engineering firms, industrial, municipal and state design engineers, city managers, directors of public works, industrial managers, conservation associations and others concerned with the design, construction and use of pollution control facilities and techniques." [p. 343]

There are numerous activities within the Federal Energy Administration which address themselves to dissemination of information on the results of research and development undertaken with FEA support. Contracts and demonstration projects are undertaken with State governments and other agencies which insure the maintenance of liaison between Federal and non-Federal bodies. There are ten regional offices of the Energy Conservation and Environmental Division which offer technical assistance to State and local governments in the fulfillment of its mandate to develop and implement programs to increase the efficient use of energy. In fulfilling this mission, assistance is provided in the administration of programs through direct seminars and workshops. State and local involvement ranges from program development to review of demonstration projects.

User-Need Determination

Speaking from a private sector orientation, Dr. Grattidge indicated that, in part, the effectiveness of scientific and technical information (STI) systems is determined by the response to real—as opposed to perceived—user needs. Within the STI systems in the industrial R. & D. sector, Dr. Grattidge stated, particular efforts are directed to the development of "needs" information related to requirements for R. & D., and the impact and content of potential R. & D. programs designed to respond to those needs. Referring to the public sector, Dr. Grattidge said that access and output of STI systems must ". . . recognize the user's characteristics and organize the access and output aspects of the system with these characteristics and their users in mind." [p. 134]

Mr. McKelvey called for better definitions of state and local government needs, interests, problems and priorities, in order to emphasize a demand-pull instead of technology-push approach to intergovernmental transfer of scientific and technical information. [p. 147] Dr. Charles Orlebeke stressed need assessment in his description of the Department of Housing and Urban Development R. & D. program to assist the public sector. Dr. Orlebeke stated:

> We begin with the conviction that the worst time to think about disseminating research results is when the final report is wrapped up. Most of the time, that guarantees a one-way ticket to the wastebasket or the back shelf. [p. 188]

The determination of user-needs is stated as policy in several of the agencies responding to written questions. Among those that are illustrative of this process are the Department of Health, Education, and Welfare, The Environmental Protection Agency and the Department of Agriculture. Various administrations within HEW conduct user-need determinations in considering the development of programs and the transfer of information. The Health Services Administration solicits State and local government agencies for sugges-

tions relating to research in the areas of program implementation. Close interaction follows through in the execution of the programs at the State and local level to insure that the programs meet user requirements. In the Health Resources Administration the State and local policy-makers are involved in the development of research plans and the National Institute of Mental Health works with the State legislatures and other policy makers on the development of mental health regulations including commitment laws which are adapted to requirements which vary for different entities and are determined by both levels of government.

The Environmental Protection Agency solicits State and local involvement in the identification of environmental problems and research requirements. Quarterly meetings of senior EPA management officials and the Regional Administrators present and analyze State, local and regional problems to determine the requirements of these units. The resulting recommendations are placed within the context of the total agency jurisdiction and appropriate actions are undertaken. In addition, various advisory committees, with both State and local representatives, are responsible for making recommendations in regard to the agency's R. & D. program.

The State and local Extension Advisory Committees of the Department of Agriculture include representatives from State and local agencies. These committees provide assistance in the definition of local problems and the planning of educational programs to transfer the latest information necessary to solve these problems. In the area of forestry, State and local representatives participate in the R. & D. user-need determination processes through personal contacts, review of study plans and participation in advisory committees. Public hearings are held to solicit formal critiques from State and local government officials. Reviews are synthesized and incorporated into future forestry planning.

Selective Dissemination of Information

The hearings occasioned frequent references to the need for *selective* information dissemination systems. In the face of the vast quantities of scientific and technical data, information resources must be tailored to the needs of State and local officials in order to make effective any type of Federal R. & D. utilization program.

It was for lack of selectivity that several witnesses were somewhat critical of Federal "outreach" R. & D. utilization programs. Dr. Marlow, Director of PENNTAP, reported varying degrees of success in dealing with Federal utilization programs, observing that he had received excellent support when he took the initiative and contacted agency personnel, but had not found agency outreach programs to be very helpful. Dr. Marlow noted that a fundamental problem hampering the effectiveness of government dissemination activities is the inability because of the lack of Federal assistance to fund direct support assistance in the application of scientific and technical knowledge to specific public problems. [p. 170]

Addressing the problem of an oversupply of information and the consequent need for tailoring it to specific needs, Dr. McKelvey drew upon his experiences in working with the NASA technology utilization activity. In trying to integrate NASA technology with private sector needs, Dr. McKelvey said he encountered the problem of too much information, and the consequent need to define the need and refine the supply.

While the complications of overload of technical information is a recognizable factor in information dissemination policies of certain agencies many tailor data to user needs. These include the Bureau of Labor Statistics of the Department of Labor and the Law Enforcement Assistance Administration of the Department of Justice. The BLS provides the States with technical assistance in the acquisition, compilation and analysis of survey results. The information gathered by the Federal bureau is made available to States in those forms which can be best suited to the requirements of the project before the state or local unit. The data is then used by the States for policy formulation and planning as well as job counseling, wage and salary administration and contract negotiations.

The Law Enforcement Assistance Administration has developed several approaches to disseminating and tailoring information to the needs of the State and local law enforcement agencies and the courts. Among the programs provided by the Office of Technology Transfer are: (1) practical guidelines for model criminal justice programs; (2) technology transfer workshops in selected model programs; (3) demonstrations of the most significant model programs; and (4) international criminal justice clearinghouse and reference services. Through the operation of these programs LEAA attempts to present selective information on successful programs—or elements of successful programs—geared to the requirements of the State and local agencies. [p. 527]

Mr. McKelvey stressed that:

> The only time the technology transfer really worked was when we would go into a company and find someone whom we could call our "technology agent" and work with him, through him, to find out the basic areas of manufacturing or production or distribution that the organization was concerned with. We could then search the NASA files and send specific information to him. He could make certain something was done. They might discard it, but they would at least try it on an experimental basis. [p. 179]

Technology-Push, Need-Pull

Two fundamental approaches to the dissemination and transfer of Federal R. & D. results are commonly identified as technology-push and need-pull. The differences implied by the two are readily apparent, and have been mentioned in the context of need identification and selective dissemination of information. During the hearings, a great deal of emphasis was placed on the preferability of need-pull over technology-push, although not to the total exclusion of the latter approach. The testimony gave voice to a widely shared criticism that Federal R. & D. utilization activities are, for the most part, too

heavily oriented to the technology-push approach. Scientific and technical information—resulting from Federally funded R. & D.—is broadcast based on perceived needs in the hope that it will be picked up and effectively utilized in both the public and private sectors. As stated by Mr. Nichols, the Maryland State Legislator:

> Most federal technology transfer efforts, including the RANN program of NSF, as viewed from the states' perspective could be typified as a "push" program. The states are viewed more as uninformed customers rather than as an intelligent user community, capable of defining their problems and, thus providing a focus for "application" needs. [p. 53]

FEDERAL PROGRAMS

The following summary of agency activities in intergovernmental science and technology reflect discussion of some of the problems and opportunities associated with extant programs, and gives some indication of requirements for new program initiatives.

To obtain a sampling of ongoing Federal activities, the Subcommittee heard testimony from representatives of the Department of Housing and Urban Development, the Department of Transportation, the Department of Commerce and the National Science Foundation. The review of program activties provided the Subcommittee with an overview of some common obstacles and constraints which limit their effectiveness, and a range of suggestions as to how the existing mechanisms could be enhanced. There was an unfortunate ommission of reference to specific examples of the important face-to-face interaction.

Department of Housing and Urban Development

Dr. Charles Orlebeke reported support of a wide range of R. & D. projects aimed at assisting State and local governments in meeting public needs. Project areas include: neighborhood preservation; public service productivity; land use; economic development; taxation mechanisms; government organizational structures; and management tools.

Although not describing each of the project area specifics, Dr. Orlebeke discussed the central aspects of the Departments of Housing and Urban Development R. & D. to approach in project selection, funding, assessment and application. The initial phase comprises an assessment of research needs which are then used as a basis from which to design and shape R. & D. projects. Once a research and demonstration program is underway, close, face-to-face interaction between the user and researcher is encouraged. Finally, when a research product is developed, it is tested in "real-life" situations and then distributed through the Division of Product Dissemination and Transfer. Dr. Orlebeke described a variety of dissemination techniques which the Department has employed, including traditional methods of press releases, speeches, articles in technical journals, brochures, etc. Among the more successful techniques he suggested were the modular exhibits for display at national and regional conferences, national workshops, various media forms including TV and radio spots and mailings of quick reading executive summaries. In concluding his remarks, Dr. Orlebeke observed that by attempting to frame R. & D. activities on the foundation of actual public sector needs, and by attempting to provide viable and dynamic links between researcher and user communities, HUD has taken significant steps in trying to apply R. & D. products to State and local needs. [pp. 188–192]

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Department of Transportation

Mr. William Steber prefaced his description of DOT program activities by quoting a statement of the Department Secretary using the example of energy efficient technology and affirming the importance of intergovernmental dissemination of R. & D. results:

> The effective dissemination of information about new technology, community demonstration projects, and financial incentives to utilize cost effective, energy efficient technology are essential elements of the complete R.D. & D. (research, development and demonstration) program. [p. 193]

DOT's programs relating to intergovernmental research, development and demonstration activities fall under the umbrella term of "technology sharing". Mr. Steber testified that the benefits of DOT's technology sharing program have been well established, making available to States and localities research results on common problems including ". . . scheduling and maintenance for transit busses, traffic control, and railroad grade crossing safety". [p. 194] Responsibility for technology sharing rests in the Office of the Assistant Secretary for Systems Development and Technology, and involve such activities as maintenance of a computerized, on-line information system covering all Department research activities with access for State and local governments, and the conduct of intergovernmental workshops. Operating administrations, such as the Federal Highway Administration and the Urban Mass Transit Administration, also administer technology sharing programs, and each maintains a designated contact through which state and local governments can obtain information and data pertaining to the application of technology to public needs. [p. 195]

In conducting technology sharing activities, the Department emphasizes the use of field offices and avails itself of appropriate university, industrial and public interest group resources. Emphasis is placed on the tailoring of research to meet community needs, and on information services to complement the printed word, i.e. workshops, seminars, and direct technical assistance.

Department of Commerce

Articulating the Department's commitment to intergovernmental science activities, Dr. Betsy Ancker-Johnson, the Assistant Secretary for Science and Technology, stated:

> We at the Department of Commerce are vitally concerned with technology transfer in its broadest sense because we regard it as essential to our mission to foster, serve, and promote the Nation's economic development and technological advancement. [p. 198]

Dr. Ancker-Johnson stated that technology transfer must be viewed as a two-way street, with local needs influencing Federal R. & D. programs, and with those programs feeding back potentially useful technologies:

> There is no merit in Federal agencies flooding States and localities with technical information and judging program success by numbers of copies distributed. Rather, Federal agencies involved in technology transfer should respond to specific needs and problems of local and State officials as seen and identified by these officials. [p. 198]

Particularly pertinent program activities are those of the National Technical Information Service (NTIS), the central collector, organizer, and distributor of Federally funded R. & D. results. Approximately 20% of NTIS customers are in State and local government agencies. In terms of services specifically tailored to State and local needs, Dr. Ancker-Johnson referred to the forthcoming publication of a new periodical entitled "Problem-Solving Technology for State and Local Governments", and to attempts to expand the collection and distribution of technical reports produced by State and local governments describing approaches and solutions to different jurisdictions problems. [p. 199] The difficulty of communicating effectively through printed materials was emphasized in discussion about the NTIS technical reports. [p. 238]

Another relevant program activity within the Commerce Department is the National Bureau of Standards Experimental Technology Incentives Program (ETIP). ETIP is currently supporting experimental projects involving procurement policy to determine areas in which public procurement at all government levels can be used as an inducement for technology transfer. Experiments are based on the supposition that through the procurement process, market place incentives for applying new technologies can be created. [pp. 199–200]

National Science Foundation

The Division of Intergovernmental Science and Public Technology administers the majority of NSF program activities relevant to intergovernmental science and technology. This program activity was begun in 1967 with the creation of the Office of Intergovernmental Science Programs, and, as described by Dr. Frank Hersman, its Director has been ". . . one of the broad-gauged programs in the Federal government for the development of intergovernmental science and technology policy". [p. 220]

Preceding his descriptions of NSF program activities, Dr. Hersman charted a trend of interest in many sectors in intergovernmental science and technology issues. Citing a number of studies, reports, meetings and related policy and program actions, Dr. Hersman effectively demonstrated a growing Federal concern with intergovernmental science and technology issues. [pp. 221–222]

Dr. Hersman noted that results of past meetings and reports led to the formation of the NSF support program, which is organized into six project areas: State Executive Program; Local Government Program; State Legislature Program; Academic Public Service Program; a Program involving Federal Laboratories and Professional Associations; and an Analytical Studies Program. It was reported that during the period of 1967 to 1975, the Intergovernmental Science Program invested about $5 million in the support of approximately 130 projects which generated about $4 of outside investment for every $1 of NSF funding. [p. 223]

One, among several of the recent, major projects which Dr. Hersman described was the "Governors' Energy Project", designed to coordinate and share information on state fuel allocation and energy conservation programs. He noted that this project had expanded considerably beyond an information exchange, that it had begun a process to develop a national energy research and development pro-

gram and that it had fostered the interstate exchange of policy-oriented information necessary to enhance state policy analysis and evaluation capabilities.

An example of a different type of fruitful program activity is the California Innovation Group (CIG), which grew out of the "Four Cities" project, initiated in 1971 and is designed to link four California cities with science advisers from aerospace and high technology industry. The CIG now consists of 10 medium sized California cities and an urban county, and is demonstrating a significant degree of success in transferring high technology to meet local government needs. [pp. 225–226]

The main areas of success of the Intergovernmental Science Program, according to Dr. Hersman, has been in the areas of management systems applications, utilization of hardware, and improved intergovernmental relations.

Interagency Coordination for Intergovernmental Science Activities

Although the hearings conveyed a general consensus that more interagency coordination for intergovernmental science was desirable, some definite steps have been taken in this direction. One sign of commitment to coordinate activities was noted by Dr. Hersman. He informed the Subcommittee that the prime sponsorship of the NSF's Office of Intergovernmental Science Programs has now been supplemented by resources and close interaction from the Department of Transportation, the Department of Housing and Urban Development, the Energy Research and Development Administration and the Federal Energy Administration. [p. 226]

During the presentation of Dr. Orlebeke's testimony, Chairman Thorton posed a question as to means by which HUD or any other agency is able to coordinate its research activities with other agencies having some concurrent or overlapping R. & D. objectives. Dr. Orlebeke replied that effective interagency coordination is important and that a variety of formal and informal channels do exist by which this occurs. The system is "far from perfect" Dr. Orlebeke cautioned, noting that "lapses [in communications of needed information] . . . do occur". [p. 189] At a later time, Chairman Thornton probed the point further by questioning the levels within agencies at which coordination seems to occur. Dr. Orlebeke perceived the bulk of coordination activities occurring at the working levels within agencies. He added that this type of coordination ". . . goes unnoticed by people at the so-called policy level". Although acknowledging a need for improving interagency coordination, Dr. Orlebeke felt that the basic mechanism of staff cooperation at the working level is in place and the primary goal now should be to make them work. [p. 250]

Offering a positive note on interagency coordination, Mr. Steber spoke of the efforts of the Committee on Domestic Technology Transfer of the Federal Council for Science and Technology (FCST) which functions to improve coordination of federal agencies in their efforts to transfer technology between governments. Mr. A. B. Linhares, a staff member of the DOT R. & D. Policy Office and Chairman of the FCST Committee on Domestic Technology Transfer, spoke of the enthusiasm of the committee members, and commented

that the committee itself provides a forum for the exchange of information, and a communication link between agencies represented. Mr. Linhares said:

> The way in which things quite often get implemented is through those committee members interacting and carrying back to their own agencies, ideas which perhaps they have picked up from other agencies. A number of the interagency activities going on now—for example, the support of the National Conference of State Legislators by five agencies—I believe is in large part a result of that interaction. [p. 250]

OTHER GOVERNMENT AND NON-GOVERNMENT DISSEMINATION MECHANISMS

In addition to the description of specific Federal agency programs for the intergovernmental dissemination of scientific and technical information, the hearings elicited discussion of other pertinent institutional mechanisms.

Federal Laboratory Consortium for Technology Transfer

The Federal Laboratory Consortium is a cooperative effort which has its origins in an informal organization of approximately 14 Department of Defense Laboratories united in an effort to apply laboratory technologies to public needs. The Consortium has now expanded to include at least 44 Federal laboratories, such as those under the jurisdiction of NASA, ERDA, EPA, DOT and the National Bureau of Standards, and has, as its major purpose, the dissemination and application of Federal R. & D. results, and Federal laboratory personnel expertise to State and local needs. According to Dr. Hersman:

> To date, more than 100 projects have been undertaken in fields such as fire and safety, environmental management and biomedical assistance. The reimbursed funding level for these projects now exceeds $12 million. [p. 226]

Since its inception, the Federal Laboratory Consortium has maintained a central contact point within the National Science Foundation, which has provided general managerial and coordination services for the Consortium. Dr. Hersman mentioned that one of the purposes in establishing the program was to determine whether the management of the Consortium might be passed from one Federal agency to another with benefiical results. It is anticipated that this intention may be put to the test in the near future, as the central Federal focus may soon be shifted from the National Science Foundation to the Department of Commerce. [p. 227]

Public Technology Incorporated

Public Technology Incorporated (PTI) is a nonprofit, tax-exempt public interest organization established in December 1971 as an institutional mechanism for applying available technologies to the problems of State and local governments. It is governed by the executive officers of the Council of States Governments, International City Management Association, National Association of Counties, National Governors' Conference, National League of Cities and the U.S. Conference of Mayors. PTI was established by these groups to act as their reserach and development arm. It has the role of risk-taker on behalf of public jurisdictions that do not have the capacity or resources to undertake research and development on an individual basis. Two major programs which are being undertaken with PTI assistance are the Urban Con-

sortium for Technology Initiatives and the Urban Technology System.

The Urban Technology System is a nationwide technology transfer experiment that has many of the techniques or approaches of the Cooperative Agricultural Extension Service. It consists of 27 scientists and engineers called technology agents assigned to 27 medium-sized local governments, generally under 500,000 in population, 16 universities, private firms, nonprofits, and Federal labs provide technical support to the agents. Public Technology, Inc. serves as system developer and manager.

The Urban Consortium for Technology Initatives was established with initial seed funding from the NSF and subsequent additional funding from other interested Federal agencies, HUD and DOT. Specifically, this Consortium has developed into an organization with a membership comprising 27 of the largest cities and six major urban counties. The actual members of the Consortium are top officials linked directly to the chief executives in the city and county governments. The central thrust of its activities is to identify and define local research and development needs so that they may be effectively communicated to appropriate offices at the Federal level. The consortium is viewed by Agency representatives testifying before the Subcommittee as a useful mechanism for intergovernmental coordination and for relating Federal R. & D. programs to actual local needs. [pp. 188, 195, 196]

Model Interstate Scientific and Technical Information Clearinghouse (MISTIC)

Five Federal agencies—DOT, ERDA, NASA, NBS and NSF/RANN—joined with the Committee on Science and Technology of the National Conference of State Legislatures to establish MISTIC for the purpose of assisting State legislatures in dealing with current technology issues, and increasing the responsiveness of Federal agencies to state legislators. Mr. Nichols noted his confidence in the projects and emphasized the person-to-person aspect.

In part, MISTIC is designed to provide State policy makers with an entree to the federal bureaucracy via a single contact person within each participating agency to coordinate assistance requests referred to that agency. An integral goal of MISTIC is to establish and strengthen communication links between legislatures, and between State legislatures and Federal agencies. [p. 28]

Pennsylvania Technical Assistance Program (PENNTAP)

An example of a highly effective State-oriented mechanism for disseminating scientific and technical information is the PENNTAP operation. Starting with an effort in 1964 to transfer technical knowledge to the industrial and business communities in the State, PENNTAP was expanded in the early 1970's to broaden its scope to deal with needs of the public sector as well. PENNTAP operates as a continuing education function of the Pennsylvania State University and utilizes 24 Penn State University Continuing Education Offices throughout the State as "receiving stations" for inquiries. The staff of these offices provides a dynamic link between the users and sources of scientific and technical information. In addition to its Director, PENNTAP has seven full-time technical specialists on the staff who

serve as field agents working to apply the available information to meet specific problems.

Dr. Marlow described PENNTAP's activities as having a two pronged approach, referred to as the reactive and active operating modes. The reactive mode ". . . involves problem solving situations which begin with technical questions asked by the user. . . . The active mode is structured to seek out new technology which can be applied to prevent problems from occurring." [p. 166]

INTERGOVERNMENTAL DISSEMINATION OF R. & D. RESULTS—PROBLEMS AND PROSPECTS

Discussion of program activities and related experiences in intergovernmental dissemination of R. & D. illuminated some commonly recognized obstacles and constraints to the process, explored a variety of organizational and institutional alternatives, and examined the scope of Federal, Regional, State and local responsibilities. Highlights of the discussion—observations, conclusions and recommendations—are considered below.

Organizational Approach

A predominant theme running through the three days of testimony and discussion was the interdependent nature of the intergovernmental dissemination process. Mr. Robert Merriam stated:

> . . . that when one deals with the Federal Establishment and its capability of making results of its technology available to State and local governments, one cannot look at it in a vacuum. One has to look at the whole range of Federal, State and local relationships. [pp. 3–4]

In answer to the Chairman's question as to the desirability of a centralized, Federally operated technology system, Mayor Arthur Holland of Trenton, New Jersey, expressed his views as to the importance of an interdependent system:

> The roles of the states are re-emerging and I think it is important that we have a strong partnership between the Federal Government and the State governments and certainly the local governments. [p. 102]

The discussion of partnerships and networks led directly to considerations of how such arrangements could be fostered. Thoughts centered on the applicability of the agriculture extension service model for the dissemination of scientific and technical information, on the role of regional councils in improving the intergovernmental delivery system, and on the strengthening of individual State and local government science and technology capabilities as well as the improvement of intergovernmental partnerships.

University Role, Extension Service Model

Dr. Charles Bishop spoke to the importance of university involvement in systems designed to apply science and technology to public needs. Dr. Bishop stated that the Department of Agriculture's Land Grant University System.

> . . . demonstrates that university research can be used to cope effectively with local problems. The USDA land grant cooperative system is organized around three basic functions: the generation of knowledge through research and development; the dissemination of the results of such research and development; and the organization of clientele or users of knowledge to increase the spread of interpretation, acceptability, adoption and eventual use of knowledge, services, and skills. [p. 124]

Dr. Bishop detailed several characteristics typical of the extension service which are important to the concept of an intergovernmental science and technology transfer system. Those characteristics are that it operates on a cooperative, network-type basis, coordinated at the national level but involving direct State participation in projects as appropriate; extension service research is user-oriented and keyed to existing problems; the service allows for constant personal interface between users and researchers through the extension service agents; its long-term, relatively stable funding allows program continuity; and it enjoys a steady resource base as a consequence of the land-grant university commitment, the availability of trained staff and information services. [pp. 124–125]

Dr. Bishop contrasted the extension service's long and highly visible success record to the marginal results of the State Technical Services (STS program which is longer funded within the Department of Commerce to bring technical assistance to the States. According to Dr. Bishop, problems in the STS program derived from insufficient and undependable funding, a lack of a nationwide organizational structure, and lack of understanding and accommodation of real user-needs. Against the background of one impressive and continuing success story contrasted by ". . . somewhat half-hearted attempt which has been discontinued by the federal government", [p. 25] Dr. Bishop suggested a basic structure for an intergovernmental science and technology delivery system. He held that for such a system to be operationally feasible, it must have an institutionalized base. Because research is a fundamental part of society and will continue to be, institutional structures must be established to accommodate it and to support it as an ongoing, continuing program.

Dr. Bishop stressed:

> If we cannot institutionalize it, we should forget it. . . . I believe that the science system must have a structural component as well as a policy component. The policy is one of making national public investment in the development of science, but we have to have a structure which will enable that science to be useful. [p. 126]

Furthering the extension service concept, Dr. Bishop suggested that the land-grant university system is a logical one to turn to for the required institutional structure. Contending that land-grant universities differ from other institutions of higher learning because of their extension and public services programs, Dr. Bishop said they could serve, in each State, as centralized units possessing multidisciplinary capabilities. [pp. 126–128]

Several other witnesses, in considering the applicability of the extension service model, expressed some reservation as to the immediate transferability of the structure. One member of the Subcommittee staff, probed some of the differences between the agricultural extension service situation and that in which a science and technology delivery system would function. Pointing to the definitive research areas with which the extension service deals, and to the fact that the extension service has its own research capability, the staff questioned the direct transferrability of the system. Mr. Nichols recognized these differences, and stated that a similar service in the "science and technology field" would require a much more broad-based program, and would have to deal with a much greater range of problem areas. Mr. Nichols continued:

However, that is not to say that if we had some kind of technology extension service, that it would not be one of the better solutions. It is one of the more expensive solutions to place those kinds of agents all over the country. I am sure you are aware of what the Agricultural Extension Service costs. It would have a much broader mission and more intergovernmental flavor because of its need to go in both horizontal and vertical directions for the collection and the synthesis of information related to particular problems. It would be an ideal kind of thing, I believe. I suspect we will have to settle for something short of that in the interim. [p. 115]

Chairman Thornton indicated a favorable disposition towards the extension service model, mentioning his recent introduction of legislation providing for an energy extension service to apply scientific research information and to disseminate it to the field, similar to the agricultural extension service program. [p. 115]

Although he did not speak of the extension service model, per se, Mr. Holland, Mayor of Trenton, N.J., stated his presumption that in any discussion of various delivery systems and networks, it was understood that universities should be integrally involved in the structure. [p. 115] Also without specific reference to the extension service concept, Chairman Thornton queried several witnesses in the second day of the hearings, as to the appropriate university role in a science and technology delivery system. "Is there room for a university to provide a council or an advisory panel which could be available on a consultant basis for small communities?" Responding to Mr. Thornton's question, Dr. Bishop spoke of the University of Arkansas' program for industrial research extensions. Similar to PENNTAP (previously described), the program operates through field offices in approximately seven different areas in the State, specifically for the purpose of making information available to local governments and to private firms in the State. [p. 180]

Still addressing the issue of university participation in the dissemination and utilization of science and technology, Mr. John McKelvey stated that the university role varies greatly from State to State:

In some States the universities have extremely high standings with governmental agencies and private industry. I think in those States it would be very advantageous to have the universities take the lead in making the presentations about science and technology. In other States the universities are not that well respected. And in those areas you can use other organizations that do have that type of respect. [p. 182]

Role of Regional Organizations

In addition to exploration of the university role, the testimony explored the existing and potential role of various types of regional organizations in science and technology delivery systems. Dr. Thomas Fox, Governor's Science Adviser, State of Pennsylvania, reported on the vitally important role played by ten intrastate regional organizations in Pennsylvania. Each one has a planning unit and each receives input about local conditions from the local Mayors and County Commissioners. In addition, they work closely with the State and Federal governments. Dr. Fox said, " . . . Sophistication at the local level can be produced in a manner which is effective and efficient, through these regional outposts." [p. 103]

Acknowledging the regional nature of many of the problems which are suitable to the applications of science and technology resources,

another member of the Subcommittee staff, questioned whether or not the Federal Regional Councils, established in 1972, offer a viable means by which regional needs can be met. Responding to the question, Mr. Merriam of the Advisory Commission on Intergovernmental Relations, stated that one of the fundamental problems thwarting the effectiveness of Regional Councils is their lack of staff. Mr. Merriam pointed to an encouraging trend of greater communication among Federal, State, and local officials through the regional council organization, "But . . . there is no mechanism for the Federal regional councils to follow through on a more organized basis in helping to identify problems which are regional." [p. 105] Mr. Merriam did note, however, that progress was being made in strengthening the role of the Councils.

Corroborating this latter point, Dr. Fox spoke of the changing nature of intergovernmental relations, using regional organization as a pivot point:

> Three or four years ago, Federal agencies and even sometimes Congress did not seem to know that the State legislatures and the States and cities were there. That has changed in Congress, for sure. And it has changed with most of the professionals in the Federal agencies. What I think is missing is the Presidential appointees, the people who come in to head the Cabinet posts do not have this understanding, that that is an important part of the world, that they should be aggressively reaching out and working with State and local governments in areas involving science and technology. They look at it as small potatoes and they pay no attention.
>
> If you had that understanding at that level, coming from the top, in addition to what is coming from the bottom, then I think it could work. [p. 105]

Expanding on this point, Mayor Holland said of the Councils:

> If they had staff whose sole responsibility it was to push the role of the Federal regional councils, then I think they could become perhaps, the agency. [p. 106]

At a different point in the hearings, Chairman Thornton, referring to the successful PENNTAP operation in the State of Pennsylvania, asked if it would be appropriate to consider adoption of this model, on a regional basis rather than on a State by State basis. Mr. Thornton asked:

> Would it be scientifically economical, economical of scientific resources and the type people who can provide these resources, to have each of the 50 States develop its own PENNTAP organization, or could regional offices perhaps meet this kind of need? [p. 247]

Dr. Ancker-Johnson responded with a conditional answer, stating that in some cases, regional organizations might be more desirable, but the determination must generally be that of the local officials involved. Continuing, she viewed the most important provision as allowing some mechanism whereby anyone having a legitimate need for help has the opportunity to gain it. [p. 247]

In further response to Mr. Thornton's question, Dr. Hersman replied that he thought regional activities were very beneficial sometimes, but—as articulated by Dr. Ancker-Johnson—it is hard to know how to shape such organizational mechanisms. He spoke of some experimental activities designed to investigate what kind of mechanisms might be appropriate to meet regional needs:

> For example, in the Pacific Northwest, four States have come together to develop a Northwest Innovation Group, which grows out of some successful activity we funded in Tacoma, Wash. In other cases, it is a more limited type

of activity built around a particular subject area such as in the Northeast, where the legislatures are getting together to examine energy policy issues. In other cases, it might be built around a particular Federal facility, like we funded the Mississippi test facility which has the considerable presence of 30 Federal R. & D. organizations to develop partnership programs with the three states of Alabama, Arkansas and Mississippi.

In other cases, we have tried to network academic types of organizations which have established identifiable public technology outreach programs. [p. 247]

Following up on Dr. Hersman's brief project summary, Mr. Thornton inquired into the specific role of the Federal Regional Councils. Acknowledging the soundness of Dr. Ancker-Johnson's point, that the type and extent of regional coorperation should be the decision of individual governmental institutions, Mr. Thornton said, ". . . we need to look at the institutions which are available and see why they do not work, if they do not, and what uses might be made of them if additional uses could be made." [p. 247–248]

Referring to a study which the NSF had recently funded, designed to examine the precise question of the role of Regional Councils in promoting the application of R. & D. results, Dr. Hersman reported that ". . . it is not entirely obvious that the Federal Regional Councils do have a significant role to play in the R. & D. area." [p. 248] He elaborated:

In connection with this study effort, we wanted to examine the roles of the Federal Regional Councils as a decentralized Government mechanism for facilitating the operation of relationships between the State, local and Federal levels. The R. & D. aspect was one aspect of that analysis. The regional councils have a very difficult time tending to their mainline business of cross-cutting operational oversight. It is by no means clear that they have a consistent set of responsibilities from their parent agencies. Some operate under one set of authorities, for example, from HUD and quite a different set of responsibilities from EPA, for example.

So, given the limitations of time and manpower, it is very difficult to get them to move from their mainline business into taking up what they would consider a more insignificant thing like R. & D. operations. [p. 248]

Federal R. & D. Laboratory Network

Turning from the discussions of regional organizations, several witnesses spoke of the appropriateness of Federal laboratories and research centers as nuclear units in an R. & D. delivery system. Mayor Holland suggested that the Federal laboratories and centers should be reorganized into delivery systems for technology transfer. He briefly highlighted the broad scale and diversified mix of activities encompassed by these organizations. "Over 500 laboratories, employing some 120,000 scientists and engineers, are scattered through 32 of the 50 American States." [p. 96] Substantiating the need for reorganization in order to provide an effective technology transfer system, he expanded his discussion and pointed to the pluralistic nature of current Federal laboratory organization and operation:

Unfortunately, they do not function within a centrally managed network structure, but instead are dedicated to and administered by different government agencies which are charged variously with missions of national defense, energy, health, agriculture, natural resources, or transportation. Their combined annual expenditures are in the range of $7 billion. However one looks at it, this is a massive technological enterprise held in public ownership by the State, and, until very recently dedicated exclusively to the purpose of the central government. The questions are how, in a rapidly changing society, this technological

capacity should be used for wider benefits, and whether the Federal laboratories have a high or only a marginal role in technology transfer. [p. 96]

Mayor Holland quoted from a speech made by William Carey, Executive Officer of the American Association for the Advancement of Science, in which he endorsed the reorganization of Federal laboratory and research center management into a science and technology system. Mr. Carey said:

The laboratories represent a vast and diversified national resource, and it is in that sense that they should be integrated into a network and utilized flexibly for a variety of both public and private purposes. [p. 96]

Mr. Carey advised that in the short run, during the time when reorganization of the laboratory system would be in the thinking and planning stages, that ". . . the emphasis should be upon technical assistance rather than upon the transfer of hard technology." [p. 96] According to Carey, this assistance should be in the form of advisory and consultative services to State, local and other non-Federal clients pertaining to problems of choosing and applying appropriate solutions to public problems. Advisory and consultation services

> ". . . all come under the head of capability building, of providing supporting technical assistance to units of government which do not have the experience or know-how to approach problems for technical, economic, and social complexity." [p. 97]

With reference to the role of Federal laboratories, it is appropriate to again mention the Federal Laboratory Consortium for Technology Transfer, discussed previously. This organization reflects interest on the part of specific R. & D. laboratories to become involved in the transfer of available scientific and technical expertise to meet public needs.

Alternative Organizations and Delivery Systems

In addition to the alternatives just discussed, witnesses advanced a variety of suggestions as to mechanisms for coordinating and delivering scientific and technical resources. Some of the suggestions called for reorganization of existing capabilities, others for the creation of new policy and/or program efforts.

Among the alternatives put forward was a suggestion made by Mayor Holland to upgrade the Federal Council of Science and Technology. Prefacing his suggestion, Mayor Holland said that since the time of the disbanding of the Office of Science and Technology in 1973, the Federal Government has lacked an authoritative coordinating voice with regard to overall Federal R. & D. policy. "This has resulted", he said, ". . . in a proliferation of confusing and at times overlapping programs." [p. 95]

Contending that this problem cannot be allowed to continue, Mayor Holland said it would appear that the only way it can be remedied is through the creation of a central policy office with adequate power to not only formulate but to execute a national research and development policy. He enumerated the following policy and program actions by which the Federal Council for Science and Technology could be upgraded and could be made ready to assume the functions of a central coordinating office.

One: Transferring the Council back to the White House and making it equal with other Federal councils, such as the Council of Economic Advisors and the Domestic Council. . . .

Two: Reorganizing by creating a three man Council, one member of which would be an individual with local government experience, with sufficient staff to formulate and execute policy.

Three: Vesting in the Council adequate authority to allow it, through the President and the Office of Management and Budget, to effect its policy decisions.

Four: Creating within the Council an office of local government research and development policy, staffing that office with individuals with local government experience and vesting in it the power to formulate and coordinate federal research and development activities that have the potential of impacting on local governments.

Five: Charging the Council with the responsibility of becoming the focal point for the dissemination of Federal research and development information. In this clearinghouse role, the council should not only become a central access point for Federal research and development information but also must be sufficiently funded so as to allow it to provide vital technical assistance as well. [p. 95]

Mayor Holland added that he also saw room for improvement in the area of local input to Federal policy and program planning processes. He argued in favor of direct local government representation, when possible, on the governing or advisory boards of Federal agencies supporting research and development activities that would concern local governments. [pp. 95–96]

The requirement for a sharper Federal focus and increased managerial capability for intergovernmental science and technology activities was also underscored by Mr. Merriam. In order to create a central focus, he stated, the missions which it is expected to encompass must be clearly articulated. The discussion of ". . . some form of umbrella body well situated within the executive branch to formulate policy and oversee what it is that we want to transfer to State and local governments, how we want to get input from those State and local governments, and then organize to meet that task, . . ." [p. 6] Mr. Merriam added that ". . . we do not have a precise enough mechanism in place nor are there signs that we soon will have it at the Federal level." [p. 6]

In considering a central office for intergovernmental science and technology, Mr. Merriam said it must be realized that it is not necessary perhaps, for a new agency to be established. He noted existing organizations such as the Domestic Council, the Office of Management and Budget, the Undersecretary's Group for Regional Operations, the Regional Councils and other organizations within the Executive Office of the President whose missions could be made to incorporate responsibility for intergovernmental science and technology. [p. 6]

A suggestion for the creation of intergovernmental science and technology policy councils was put forward by Dr. Fox. He suggested that,

> "Coordination of Federal, State and local governmental efforts depends critically on the creation of Intergovernmental Science and Technology Policy Councils in the proposed Federal Office of Science and Technology and in all appropriate federal agencies." [p. 71]

Dr. Fox spoke more generally about fundamental requirements for effective intergovernmental partnerships for dissemination and utilization of science and technology resources. He said:

If you are to have a partnership that works, you have to have some policy group, involving both people at the producing level—in this case the Federal Government—and at the user level—in this case, the State and local institutions. [p. 71]

Furthermore, Dr. Fox stressed that programs for intergovernmental science and technology:

. . . should have a State-Federal working partnership with policy program guidelines and procedures jointly developed and maintained. It should be flexible and action oriented. Each state would identify its own technical utilization needs and its own delivery service to provide it to users. The Federal role would be in the design and coordination of the information networks including regional operations, making the information available. Existing storehouses of such information should be plugged in and so on. [p. 71]

Policy Management Assistance

Offering a different perspective, Dr. Hersman reported on the basic findings of a study conducted by the OMB Study Committee on Policy Management Assistance. One of the Committee's objectives was to assess the overall Federal R. & D. support in the larger context of Federal intergovernmental functions. Primarily, the report addressed the question of how the Federal Government might assist in improving State and local government management capabilities. The report demonstrates recognition of the heavy demands imposed by the Federal Government on State and local management capacities, but nevertheless concludes that the principal responsibility for remedying management deficiencies lay with State and local governments themselves. Dr. Hersman added, however, that the responsibilities of the State and local governments are heavily influenced by Federal actions. Stating that the report does not offer prescriptions, but instead is aimed at encouraging national discussion and debate about the future roles of all partners in the intergovernmental system, he outlined a three part strategy for Federal action:

First of all, the report recommends that there should be a reorientation of Federal domestic programs in order to minimize the administrative burdens on State and local governments and the conflicts with local priorities.

Actually, what that recommendation is attempting to get at is the problem of bringing about genuine intergovernmental partnerships between our levels of government instead of the arms length dealings which currently characterizes the Federal stances with respect to the State and local governments.

Second, the report recommends expanding and coordinating Federal public management assistance, specifically aimed at strengthening the overall management capacity of State and local governments that desire assistance.

Third, it recommends bringing about the improvement of the Federal Government's machinery for conducting intergovernmental business in order to bring about more effective State and local participation and liaison. [pp. 229–230]

Chairman Thornton raised a question which pertained to potential mechanisms for cutting across the various agency R. & D. capabilities to allow for joint program planning and to increase accessability of Federal scientific and technical resources for State and local governments. Dr. Hersman responded:

My own belief would be that you need new cross cutting program mechanisms which can effectively mobilize Federal agencies which have knowledge to bring to bear on a problem, from related State and local government groups, and from the R. & D. performers themselves, whether they be universities or industry. [p. 230]

Dr. Hersman added that it was unclear to him where this initiative should come from, whether it should be stimulated through Federal support, or whether it should be brought about by State and local governments themselves:

> If the latter happened, I think the efforts would tend to be fairly small at the beginning. They would probably be tighter than if they were stimulated under Federal support. Any new mechanisms, however, which might be developed. I would think would not be to supplant existing Federal efforts. Instead, they should be designed to increase the relevance and the synthesis of existing Federal efforts. I think any effort like this which would be brought into being at the Federal level, would have to come from initiatives taken through the Office of the President and not under the auspices of any particular Federal agency. [p. 230]

User-Community Capabilities

A general consensus arose from the discussions about the importance of building or strengthening science and technology capabilities at the State and local government levels. The witnesses stressed the requirement for States and localities to be active, able participants in the intergovernmental R. & D. dissemination process and many thought the Federal Government could be helpful in this area. Dr. Fox made the following point:

> An effective national information dissemination system must involve Federal efforts to package the needed information, coordinated with, and responsive to, information networks constructed by individual States or groups of States, to provide individual response and assistance to the local user. [p. 71].

Accordingly, Dr. Fox put forward a plan for a Federal assistance program, on a step-funding basis, to allow States with existing science and technology capabilities to strengthen them, and to allow other States, as appropriate, to build new capabilities. [pp. 71–72].

Federal programs which build the user capabilities of State and local government are in evidence in several of the agencies, two of which are mentioned here. The Department of Labor Statistics has made efforts to improve the capabilities of the States by providing technical assistance in the gathering, use and assessment of statistical data. The States act as collection agencies for the Bureau and the information compiled is put to use through various Federal-State cooperative programs. Among the areas in which there are technical programs designed to improve the capabilities of the user States are: area unemployment statistics, industrial employment statistics, labor turnover statistics, and occupational employment statistics.

The Geological Survey within the Department of Interior also works to supplement the technical user capabilities of the State and local governments. Through the provision of information on the Earth's surface features the Geological Survey provides State and local agencies with information on the identification and evaluation of resources and land-use alternatives. This in turn expands the policy options and the decision-making capabilities of the State and local units.

With reference to supplying aid to States and localities in the interest of science and technology capability building, a question was raised as to the appropriateness of providing technology agents to serve the needs of State and local officials. Dr. Hersman responded that

the answer would vary considerably according to State and local situations:

I would dare say that some States and local governments are as good as the Federal Government in understanding what their research needs are, stimulating research appropriate to those needs and applying the research in their own operational processes. Other States simply do not have the manpower or the financial resources to mount appropriate programs. [p. 240]

Continuing, Dr. Hersman stated that a national purpose could be served through building the capacity of the State and local offices to enable them to work more effectively with the Federal Government. It is an arguable point, Dr. Hersman noted, as to where the funding should come from for such selectively targeted support programs to improve State and local capabilities. Indicating that such expenses should be shared, Mr. Linhares of the Department of Transportation spoke of ". . . training activities in which the States and local personnel can participate, direct technical assistance from the Federal level, technical assistance teams supported by Federal, State or local levels, and others. [p. 241]

Mr. McKelvey indicated that a significant, although not highly visible, problem affecting intergovernmental R. & D. dissemination programs, is a widely held misconception of State and local competence in the science and technology area. The problem results from:

The often heard comment that State and local governments are not equipped to handle scientific and technological issues related to policy formulation—basically, the view that State and local government doesn't have the expertise to use technology effectively. This may have been true in the early 1960's, but it is no longer the case in the 1970's. State and local governments, through efforts of their own, the National Science Foundation, NASA, and others, have acquired the ability to investigate the applicability of science and technology to their pressing problems. [p. 146]

The above references reflect only some of the comments concerning State and local capacity-building. They effectively convey, however, a widely shared concern about State and local capabilities, and a general sense of agreement as to the vital role which States and localities must play as partners in an R. & D. delivery system.

Funding Commitment

Many witnesses spoke of the problem of finances. A lack of financial commitment to a science and technology delivery system—no matter what the structure or approach—can constitute a severe detriment to its functional capacity. Mr. Nichols pointed to an insufficient financial commitment as a primary stumbling block to ongoing Federal efforts:

The Federal government is certainly not lacking in policy initiatives or guidelines to develop comprehensive technology utilization programs for State governments. However, what is lacking is the commitment of fiscal resources to implement them, and within Federal agencies, a strong administrative commitment at the top managerial levels.

As stated in several studies over the past 5 years, the minimal allocation of funds for the technology transfer utilization programs by the Federal agencies, and thus the absence of their administrative commitment are among the major contributing factors to the lackluster performance of Federal-State technology transfer activities. [p. 43]

Mayor Holland cited a statistic that only 0.25 percent of the total Federal R. & D. budget is being spent by the Federal Government to

transfer and promote the utilization of all Federal R. & D. efforts. "We are faced with the overwhelming reality," he said, "that the majority of the Federal R. & D. effort is not designed to help local governments." [p. 97]

Stressing the need for continued, dependable funding for technology transfer activities, Mr. McKelvey stated, "Technology transfer is a continuous process and should be supported as such. If you believe you can take one action, walk away, and expect something to happen, you are wrong." [p. 148] He continued:

> The risks associated with these efforts are not great in any technical sense, but the risks of not getting the right technology to the right place are terribly important in economic and social terms. When expectations are raised and then unmet, we have real problems. [p. 148]

Along this same line, Dr. Marlow was asked whether or not the Federal Government should increase its investment in the application of science and technology to public needs—to provide resources over and above those made available through revenue sharing. Dr. Marlow responded:

> The potential payoff for applying known science and technology in the public sector is fantastic, if we can accomplish this. The kind of payoff which is there—we have just begun to scratch the surface. In our own state we have better than 2,200 post offices. We have about 3,000 units of government. For example, the one unit we did with the National Science Foundation and Department of Navy in preventive maintenance in the public schools, just that one little segment, has an energy saving potential that makes the operating cost of this program look like peanuts. [p. 181]

Personal Interface

Another factor, believed to be extremely important no matter what the delivery structure, is that of person-to-person interaction. Mentioned previously in the context of elements and characteristics of the intergovernmental R. & D. dissemination process, person-to-person contact was identified by many of the witnesses as one of the key factors in effective transfer.

Mr. Nichols observed:

> At the present time it is the personal networks of people involved in the State legislatures which results in technology being brought into state and local problems more so than some particular kind of institution. [p. 109]

Underscoring the role of people, Mr. Merrian stated, " . . . even the best of organizational structures will not guarantee effectiveness." A critical element is:

> The ability of key R. & D. administrators to span and bring together not only the two cultures of science and humanities, but the three worlds of government within our Federal system. Persons within the field tell us that the separateness and barriers are still formidable and relatively few people are equipped to bring the parts together to serve the Federal system as we would like to have it operate. [p. 7]

Mr. McKelvey stated that when considering factors in the information delivery process, it is necessary to find individuals within the user communities—specifically State and local governments—to whom the information will be meaningful. Without actual recipients, it is difficult to get any information effectively transferred into State and local organizations. [p. 179]

User-Need Assessment/User Receptivity

No matter what the structure of a delivery system, if it attempts to transfer scientific and technical resources ill-suited to the needs of the intended user communities, i.e. State and local governments, the system will be largely ineffective. The necessity for cultivating an accurate understanding of specific needs, and a sensitivity as to the nature of the environment in which the needs must be addressed, were factors frequently emphasized throughout the three days of hearings.

Dr. Fox provided a colorful example of a technology-need mismatch, by speaking of an attempt to foster the utilization of highly sophisticated mass transit technology, when the technology in question was not at all suited to community's needs:

> We heard a statement earlier that maybe the States and local levels were not advanced enough to use modern Buck Rogers technology in mass transit. Maybe the people who decided to invent Buck Rogers' modern technology for transit were not aware of the realities of life and the restrictions, in many ways, as to what you can actually do, including an ability to pay for it. So, I don't think the problem was that we were old fashioned at the local level necessarily. It is a fact that the people at the Federal level, in charge of this, just were not in contact with reality when they were thinking of 300 miles per hour for commuter transit and the like. [p. 72]

Paralleling this point, Dr. Grattidge of General Electric Co., linked the potential effectiveness of information dissemination services with an ability to create a "user-pull rather than a technology-push" situation. Dr. Grattidge remarked:

> The aggressive outreach programs are only effective when there is receptivity at the other end and therefore the outreach is in effect developing the market. [p. 135]

Mr. McKelvey put the factor of contextual fit into a slightly different perspective. He mentioned that one of the most important steps in the transfer process is the integration of available technology, or technical information, into the existing social system. "It is at this interface", he cautioned, "that success or failure becomes obvious. A whole host of institutional barriers stand ready to prevent successful transfer of technology." Mr. McKelvey gave an illustrative example:

> Consider the problem of developing onsite home solar heating and cooling. While the technology to heat and cool a private residence with solar energy is available, factors such as local building codes, lending institution policies, the unfamiliarity of architectural and engineering firms with the design of the systems, the availability of standardized equipment, and some incentive for developers to incorporate the technology—all must be aligned to bring the technology into wide use. [p. 147]

Similarly, Dr. Bishop emphasized user receptivity as a prime determinant of the potential effectiveness of technology transfer efforts. He suggested that:

> Technological change will take place most readily when the potential users of new technology understand the probable consequences of applying it to their particular circumstances. Potential users, therefore, are encouraged to examine and evaluate new technology and, when appropriate, are motivated to use it in coping with their problems. [p. 125]

Dr. Hersman reported on experimental efforts directed at the development of "demand structures" derived from various State and local government needs. It is intended that by drawing up demand

profiles, scientific and technical resources can be keyed to specific problems. Another objective is to get State and local representatives to develop appropriate relationships with the numerous Federal agencies. State and local governments, Dr. Hersman said, ". . . should be in touch and actively soliciting a relationship, for example, with NTIS, with the HUD Office of Product Dissemination, and so forth". [p. 240]

Level of Commitment and Reward System

During the hearings there was an identification of factors which influence the intergovernmental dissemination process—in both positive and negative directions—and which seem generally independent of the organizational or institutional framework. These factors are particularly important in terms of policy implications which may be derived from them.

Factors considered to be of notable importance include the level of managerial commitment to a technology transfer effort, and the reward structure within which participants in the effort must operate. With reference to the former, Mr. McElvey, speaking from "real experience" stated:

> First, and foremost, successful programs require a commitment from the top. Two obvious aspects of this commitment are money and manpower. We are not necessarily suggesting an expansion of expenditures for these needs; rather, closer scrutiny of existing programs may indicate more fruitful resource allocation strategies. [pp. 145–146]

In his discussion of elements important to the creation of a Federal structure for intergovernmental dissemination of R. & D., Mr. Merriam made a similar point:

> . . . if past experience is a clue, even the best of organizational structures will not guarantee effectiveness. Critical elements [include] the commitment of the President. [p. 7]

Similarly, Mr. Linhares, in considering elements of an effective and viable technology transfer program, stated that although the size of the office to administer technology transfer and the size of the budget specifically targeted for that office are important, they are not ". . . as important . . . as having a very strong commitment by management, supporting you in your activities to be a catalyst". [p. 252] Mr. Linhares continued, ". . . You can make a lot of things happen with very few resources, if you have this commitment." [p. 253]

Mr. Linhares then discussed the importance of the reward system:

> I think traditionally, the rewards have been for doing "good research" as evaluated by other researchers rather than doing research which, in fact, makes an impact out in the public sector. The tendency has been, I think, to "Reward good research within the research community". . . . But I see a change occurring and I think there has to be more emphasis on rewarding research because it, in fact, makes a difference out in the public sector. [p. 253]

SUMMARY

The hearings gave voice to a wide variety of perspectives and recommendations pertaining to intergovernmental dissemination of Federal R. & D. products. The hearing record contains numerous implications for policy and program action. It does not endorse any one particular policy or program approach, but it would be unrealistic to expect that it would. The process of making use of science and technology in the public sector is too complicated to lend itself to a single policy, program format, or procedure. The record does, however, contain extensive information—derived from study and practice—as to institutional and policy features important to an effective intergovernmental R. & D. delivery system.

A prevailing sentiment throughout the hearings favored a network or interaction within and between the levels of government. Testimony and discussion pointed to the complexities involved in accurate need-assessment, identification of appropriate technology to meet the needs, linkage between the research and user communities, etc., and indicated the requirement for cooperative partnerships and coordinated systems by which to deliver and apply scientific and technical resources.

With reference to the responsibility of the Federal Government, there was general agreement that a central focus for intergovernmental science and technology should be provided at the national level. To reiterate, the record demonstrates that there is a requirement for interagency R. & D. program coordination; a need for a coherent approach to dissemination activities directed in regions, States and localities; a coordinated program for providing financial and technical assistance to create or strengthen science and technology capabilities; and a central organization through which regions, States and localities can tap Federal resources.

Provision for some type of person-to-person interaction is important to the effective transfer of scientific and technical information. Need-assessment is central to the effectiveness of a delivery system, as it has been found to be highly unlikely that information broadcast out to a wide-ranging, somewhat undefined user community, will be adopted. Commitments of management, manpower, and funds are necessary to a successful intergovernmental delivery system.

APPENDIX

List of Witnesses

HEARING ON INTERGOVERNMENTAL DISSEMINATION OF FEDERAL RESEARCH AND DEVELOPMENT RESULTS

November 4, 1975:

Robert E. Merriam, Chairman, Advisory Commission on Intergovernmental Relations.

J. Hugh Nichols, Member, House of Delegates, State of Maryland.

Dr. Thomas G. Fox, Governor's Science Advisor, State of Pennsylvania.

The Honorable Arthur Holland, Mayor of the City of Trenton, New Jersey.

November 5, 1975:

Dr. Charles E. Bishop, President, University of Arkansas, Fayetteville, Arkansas.

Dr. Walter Grattidge, Manager, Technical Information, Corporate Research and Development, General Electric Co., Schenectady, N.Y.

John McKelvey, President, Midwest Research Institute, Kansas City, Kansas.

Dr. H. LeRoy Marlow, Director, PENNTAP (Pennsylvania Technical Assistantance Program), University Park Pennsylvania.

November 6, 1975:

Dr. Charles J. Orlebeke, Assistant Secretary for Policy Development and Research, Department of Housing and Urban Development: accompanied by Claude Barfield, Allan Siegel, and Heather Avelihe.

William Steber, Acting Assistant Secretary for Systems Development and Technology, Department of Transportation; accompanied by A. B. Linhares.

Dr. Betsy Anker-Johnson, Assistant Secretary for Science and Technology, Department of Commerce; accompanied by Robert B. Elert and William T. Knox.

Dr. M. Frank Hersman, former director, Office of Intergovernmental Science and Research Utilization, National Science Foundation.

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